

## WHAT IS CLAIMED IS:

1. A diagnosis support apparatus which supports diagnosis by processing an image, comprising:
  - an enhancement unit configured to enhance a
  - 5 circular shadow existing in an image by enhancing a pixel value gradient of the circular shadow; and
  - an extraction unit configured to extract an isolated shadow from the image enhanced by said enhancement unit.
- 10 2. The apparatus according to claim 1, wherein said enhancement unit enhances the pixel value gradient of the circular shadow while suppressing an overall pixel value gradient of the image.
3. The apparatus according to claim 2, wherein said
- 15 enhancement unit
  - calculates a normalized gradient of each pixel of the image, and
  - determines a pixel value of a predetermined pixel on the basis of a sum of inner products of normalized
  - 20 gradients of a plurality of surrounding pixels on a circumference at a predetermined distance from the predetermined pixel and unit vectors extending from the plurality of surrounding pixels to the predetermined pixel.
- 25 4. The apparatus according to claim 1, wherein said extraction unit extracts an isolated shadow from the enhanced image by using a morphological filter.

5. The apparatus according to claim 1, wherein said extraction unit

acquires, as a first pixel value, a maximum pixel value from all pixels, of the respective pixels in the image, which are located within a first predetermined distance from the predetermined pixel,

acquires, as a second pixel value, a maximum pixel value from pixels which are located at not less than a second predetermined distance and within a third predetermined distance from the predetermined pixel, and

sets a difference between the first pixel value and the second pixel value as a value of the predetermined pixel.

6. The apparatus according to claim 1, further comprising a labeling unit configured to label a region, of the isolated shadow extracted by said extraction unit, which exhibits a pixel value not less than a predetermined pixel value.

7. The apparatus according to claim 1, wherein the apparatus further comprises a generating unit configured to generate a high-frequency image by extracting a high-frequency component from the image, and

said enhancement unit generates an enhanced image by enhancing a circular shadow existing in the high-frequency image.

8. A diagnosis support method which processes an image for diagnosis support, comprising:

an enhancement step of enhancing a circular shadow existing in an image by enhancing a pixel value gradient of the circular shadow; and

an extraction step of extracting an isolated shadow from the image enhanced in the enhancement step.

9. The method according to claim 8, wherein in the enhancement step, the pixel value gradient of the circular shadow is enhanced while an overall pixel value gradient of the image is suppressed.

10. The method according to claim 9, wherein in the enhancement step,

a normalized gradient of each pixel of the image is calculated, and

a pixel value of a predetermined pixel is determined on the basis of a sum of inner products of normalized gradients of a plurality of surrounding pixels on a circumference at a predetermined distance from the predetermined pixel and unit vectors extending from the plurality of surrounding pixels to the predetermined pixel.

11. The method according to claim 8, wherein in the extraction step, an isolated shadow is extracted from the enhanced image by using a morphological filter.

12. The method according to claim 8, wherein in the extraction step,

a maximum pixel value from all pixels, of the respective pixels in the image, which are located within a first predetermined distance from the predetermined pixel is acquired as a first pixel value,

5 a maximum pixel value from pixels which are located at not less than a second predetermined distance and within a third predetermined distance from the predetermined pixel acquires is acquired as a second pixel value, and

10 a difference between the first pixel value and the second pixel value is set as a value of the predetermined pixel.

13. The method according to claim 8, further comprising a labeling step of labeling a region, of the  
15 isolated shadow extracted in the extraction step, which exhibits a pixel value not less than a predetermined pixel value.

14. The method according to claim 8, wherein  
the method further comprises a generating step of  
20 generating a high-frequency image by extracting a high-frequency component from the image, and

in the enhancement step, an enhanced image is generated by enhancing a circular shadow existing in the high-frequency image.

25 15. A control program for causing a computer to execute a method defined in claim 8.

16. A computer-readable memory storing a control

program for causing a computer to execute a method  
defined in claim 8.